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VACCINATION WITH MAP SPECIFIC PEPTIDES REDUCES MAP BURDEN IN TISSUES OF INFECTED GOATS

As an alternative to protein-based vaccines, we investigated the effect of post-exposure vaccination with Map specific peptides in a goat model aiming at developing a Map vaccine that will neither interfere with diagnosis of paratuberculosis nor bovine tuberculosis.

Peptides were initially selected by two strategies 1) in silico selection of unique Map peptides (compared to other Mycobacteria) and with predicted binding to 5 known bovine MHC class II molecules or 2) hydrophobic peptides unique to Map from selected proteins. Based on immunogenicity studies in goats a subselection of 23 MAP peptides (20 µg each) was formulated in a cocktail with Montanide ISA 61 VG adjuvant in a ratio of 1:1½.

A post-exposure vaccination study was performed with 10 goats orally inoculated with 4x10E9 live Map in their third week of life and randomly assigned to two groups of five goats each. One group was left unvaccinated, while the other was vaccinated at 14 and 18 weeks post Map inoculation with the peptide cocktail. At termination 32 weeks post Map inoculation, Map burden in 15 gut tissues and lymph nodes was determined by quantitative IS900 PCR.

Of the 75 tissue samples from the 5 unvaccinated goats only 5 samples were IS900 qPCR negative. In contrast, only 9 samples in total from the 5 peptide vaccinated goats were IS900 positive with a highly significant ($p<0.0001$) difference in Map numbers between the group. All immunized goats responded with strong IFN-γ responses to the peptide pool from 2 weeks post 1st immunization and throughout the study while unvaccinated goats were unresponsive to the peptides at all times. IFN-γ responses to PPDj were low in all goats at all times, except for one peptide vaccinated goat that responded from 26 weeks post inoculation and onwards. A single goat in the unvaccinated control group seroconverted in ID Screen® ELISA at last sampling prior to euthanasia.

These results indicate that a subunit vaccine against Map can induce a protective immune response against paratuberculosis in goats.